

Conservation of freshwater mussel resources in Virginia:

Strategies for managing a critically imperiled fauna

Why are freshwater mussels at risk?

Mussels are filter feeders and are sensitive to changes in the quality and quantity of water. Water pollution (point and non-point sources), impoundment (restricts host fish and mussel dispersal), sedimentation, stream channelization and dredging, chemical spills (and resulting fish kills), and invasion by exotic species have threatened most of the existing mussel habitat.

What can we do to protect aquatic environments?

Maintain riparian buffer zones, reduce chemical pollution, enhance host fish habitat, reduce sedimentation, and protect existing areas that have high species diversity.

Where do we start?

The Clinch and Powel Rivers in VA/TN have been identified as a national top-priority recovery area because of the high number of resident at-risk fish and mussel species. Population levels are at critically low levels and may not be able to recover without assistance.

What is the best strategy?

We must rebuild critically low mussel populations through intensive culture and propagation programs. Initially, we are focusing on augmenting existing mussel beds to enhance natural reproduction.

History of DGIF Mussel Management & Research

1980's to present: Collaborate with partners (U.S. Fish & Wildlife Service, U.S. Geological Survey, Virginia Tech, The Nature Conservancy, Tennessee Valley Authority, and others) in studying species distributions, life histories, and threats.

1990's to present: Focus on critically threatened or endangered species and habitats.

1996-present: Examine the feasibility of culturing mussels and host fishes within current DGIF hatchery infrastructure.

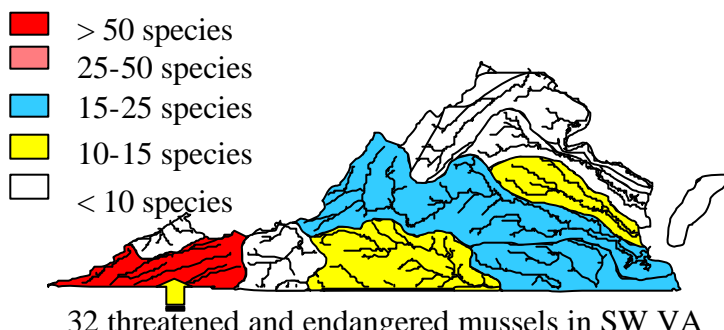
1997: Establishment of the Aquatic Wildlife Conservation Center as a mussel and fish propagation facility at Buller Fish Cultural Station. Our success is largely due to reproduction of natural conditions with riverine water, and gravel and sand substrates.

1998-present: Examine holding capabilities for 24 species of non-endangered mussels as surrogates for listed species. Begin culture and long-term grow-out of juvenile mussels in controlled semi-natural hatchery settings.

2000-present: Achieved high survival and good condition of mussel species at the hatchery. Established a brood stock base for culture of juveniles for grow-out to adulthood. Adults reproduced synchronously with wild populations. Began examining the potential for endangered species culture, and selection of best augmentation sites.

2001: Survey one of preselected augmentation sites for species presence/absence. Develop release strategy to augment various age classes from age-0 to adults.

2002 and beyond: Survey additional sites and augment additional populations. Evaluate release success and proceed with advanced techniques and methods.

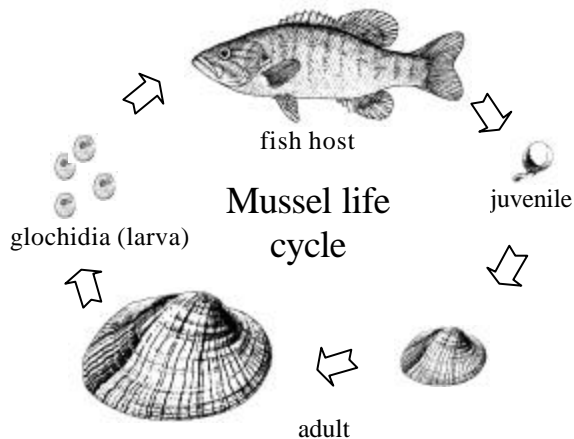


Number of Virginia mussel species by watershed

Facts about Mussels



www.dgif.state.va.us



Life Sizes

Relative size of larval, juvenile, and adult mussels

LARVA		
1	500	5,000
# of larva (= glochidia)		



1 adult shiny pigtoe

JUVENILES
200 age 0 juveniles



age 3 wavyrayed lampmussel

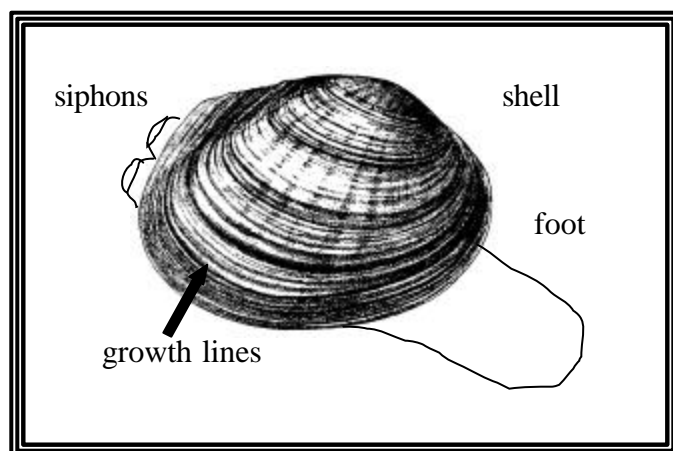
- ◆ ~ 300 species in North America, 80 in Virginia.
- ◆ 36 threatened or endangered species found in Virginia
- ◆ The most endangered group of animals in the US
- ◆ Classified as invertebrates (mollusks: related to oysters)
- ◆ Filter-feeding ability reduces bacteria, algae, and suspended particles in water column
- ◆ Need clean water and appropriate habitat to survive
- ◆ Have a complicated life cycle
- ◆ Need specific fish hosts (e.g., bass & panfish) to complete their life cycle
- ◆ Shells provide attachment sites for fish eggs and invertebrates, which serve as primary food items for many fishes and birds
- ◆ Live in the bottom gravel and sandy areas of lakes & rivers
- ◆ Can live to average age of 20-100 years

Highlights of the 2001 mussel release in the Clinch River

Species (status)	Status	Release # & (age in years)
wavyrayed lampmussel, <i>Lampsilis fasciola</i> ,	not listed	2000 (age 0), 100 (age 3)*
Cumberland combshell, <i>Epioblasma brevidens</i>	Federally Endangered	200 (age 0)
Oyster mussel, <i>Epioblasma capsaeformis</i>	Federally Endangered	50 (age 0)
Adult relocation of four common species from adjacent mussel bed	not listed	~50 of each species (ages 6 to 40)*

* Individually marked with Hallprint Shellfish tags

Mussel Anatomy



fantail darter, a common host fish